



entsooe

Reliable Sustainable Connected





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- Response to CEER public consultation on regulatory aspects of integration of wind generation

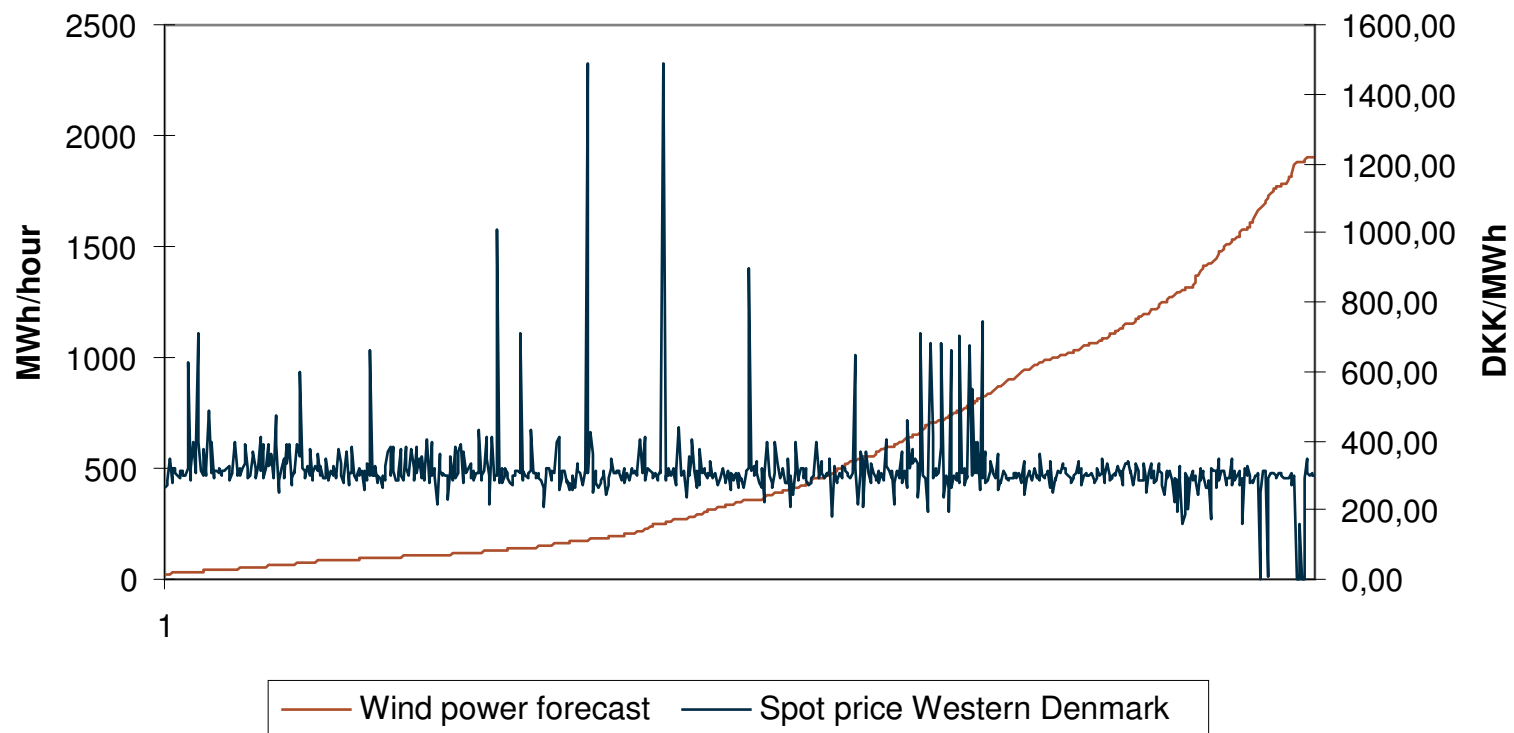


Increased wind generation in the future

- The 20-20-20 goals will lead to an increase in wind generation (and renewables in general)
 - future challenges will be different from historical challenges and TSOs play a key part
- TSO core business is maintaining system security
- Wind integration will strongly affect the market place
 - But no need to redesign the market to ensure efficient integration
 - Market based incentives will support integration
- ENTSO-E will constructively play a part in integrating more wind
 - update market rules, where needed
 - address operational/technical issues
 - work toward solutions together with wind associations, regulators and other stakeholders

Wind power and spot prices - example

Wind power forecast and spot price Western Denmark January 2009





Efficient integration of fluctuating wind generation (1)

- **Development of measures to promote market based solutions**
 - Demand response
 - Flexibility in generation
 - increased need for reserves due to the fluctuating nature of wind generation
 - International trade
 - efficient cross border trade provides the possibility for trading wind power in larger geographic areas
 - Wind generators to participate in markets for ancillary services to ensure security of supply while integrating more wind



Efficient integration of fluctuating wind generation (2)

- **Grid infrastructure**
 - A strong transmission grid (including international interconnectors) is a precondition for integrating large amounts of wind power into the grid
 - Wind generation is usually located where wind conditions are best and often far away from consumption
 - Important that Member States improve authorisation procedures
 - Ownership of offshore grids
 - Owned and operated by TSOs or entities with TSO requirements

Efficient balancing

- **Increasing wind generation will result in larger imbalances**
- **Balancing obligations**
 - From a market perspective wind power should be subject to the same balancing obligations as other types of generation (fair and transparent market)
 - incentivise wind generators to e.g. invest in more accurate forecast tools
- **Improved accuracy in forecasts will result in better wind generation schedules**
 - A prerequisite for efficient balancing of the system
- A Danish wind forecast example
 - At wind speeds between 5 and 15 metres per second, a single, unpredicted m/s increase or decrease will cause the Danish wind turbines to feed approx. 350 MW more or less into the power system.
 - However over the past years forecasts have improved significantly



TSO involvement in R&D

- **Important that TSOs are involved in R&D**
 - to understand the requirements and needs of the power system when integrating more fluctuating wind
 - including specification of topics, analysis, validation of results and full scale demonstrations
- **ENTSO-E R&D plan “EUROGRID 2020”**
 - in public consultation at the moment